

C. HDTV Converter Development

- i. PERT Chart
- ii. Gantt Chart

D. HDTV Headend Equipment

- i. PERT Chart
- ii. Gantt Chart

E. HDTV Scrambler Development

- i. PERT Chart
- ii. Gantt Chart

4. Common Carrier Information

A. Video Distribution Using SONET at OC-12/24

- i. Supporting List of Assumptions
- ii. PERT Chart
- iii. Gantt Chart

5. Satellite Distribution Information

A. Terminal Equipment Development

- i. Supporting List of Assumptions

The list of Assumptions is General only. It is based upon inputs received from industry experts some time ago. Updating is required. More recent input is being sought.

- ii. PERT Chart
- iii. Gantt Chart

6. Consumer Products Information

A. Television Receiver Development

- i. Supporting List of Assumptions
- ii. PERT Chart
- iii. Gantt Chart

7. Questions for Proponents

Questions are posed for Proponent response at the follow-up meeting to be scheduled in March, 1992. Questions are categorized as General and as related to each of the industry segments listed in 2-6 above.

IS/WP-2 PERT Chart

Supporting List of Assumptions

Local Station: Widescreen 525/2:1, 16X9 - Scenario 2

General Assumptions

1. Local Station is studio facility up to input of Studio-to-Transmitter Link (STL)
2. Station is commercial operation - order of tasks for public station somewhat different
3. Station is network affiliate - order of tasks for independent somewhat different
4. Programming on HDTV & NTSC channels is mostly simulcast
5. Station has two studios and control rooms
6. Station will maintain current level of production for long term
7. Network distribution may be full HDTV or Widescreen 525 during transition
8. Up-Converter required to air Widescreen 525 programming on HDTV channel
9. Line converter required to air Widescreen 525 programming on NTSC channel
10. Widescreen 525 can serve as low cost input for all HDTV transmission systems
11. Performance will be less than HTDV but far superior to NTSC for up-conversion
12. Widescreen equipment can also operate in 4:3 aspect ratio on switchable basis
13. Widescreen 525 can also serve as input for EDTV systems
14. Widescreen 525 encompasses several modes of operation:

Digital components	Digital composite
Analog components	Analog composite
15. Digital components at 18 MHz sampling yield highest performance up-conversion
16. Digital systems operate with serial digital interconnection
17. Digital systems require replacement of most existing equipment
18. Analog systems allow combination of modification & replacement
19. Space is available for installation of new/additional equipment
(No walls, HVAC, lighting, consoles, racks, power required)
20. Design effort includes full documentation

Notes

1. Times given in associated PERT and Gantt charts are for sake of example only
2. Times given in PERT and Gantt charts will be adjusted based on manpower resource levelling
3. Tasks shown in parallel at various stages are to indicate only relative location in overall transition
4. Tasks shown in parallel may not occur in parallel once manpower availability is taken into account

Specific Assumptions

Task 12 - Release Facility Conversion/Installation

A. Assumptions

1. All equipment must be available before start
2. Network HDTV feeds not time zone specific - no regionals
3. Single transponder, single feed for HDTV
3. Manual control used for HDTV bypass, as given in Scenario 3
4. Install in existing MCR while on air
5. Output up-converted for HDTV channel transmission
6. Initial record/playback capability part of release facility
7. Input HDTV material down-converted for recording/editing
8. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

Satellite receiver
Release switcher (modification optional)
Upconverter
Downconverter
VTRs (modification optional)
Character generator (modification optional)
Monitoring/test (modification optional)

Task 13 - VTR Edit Facility Construction/Installation

A. Assumptions

1. Initial editing capability to assemble programs/promos/commercials
2. Material supplied from outside station
3. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

3 - VTRs (modification optional)
Switcher - small (modification optional)
Character generator (modification optional)

Milestone 14 - Initial Widescreen Operation

A. Assumptions

1. Programming is either network-distributed or line-converted from NTSC
2. No local playback of HDTV programs or commercials - only Widescreen
3. Program switching has full capability
4. Operation sufficient for occasional use - not full-time activity

Tasks 15 & 16 - Studio Conversion and Switcher & Special Effects - Phase I

A. Assumptions

1. Studio operations must continue during conversion
2. Alternate control room provided or Widescreen facility built in parallel
3. Studio physical condition adequate for Widescreen (especially floor, lighting)
4. Production issues addressed separately and not limiting to conversion
(sets, shot blocking, lighting, etc.)
5. Digital effects small scale, if at all
6. Audio requires no change
7. If existing equipment modified, manufacturers provide instructions/parts

B. Studio Conversion Equipment (Task 22)

Cameras (modification optional)
Camera cable
Promoters

C. Switcher & Special Effects Equipment (Task 23)

Switcher w/effects (modification optional)
Monitors (Pix & WFM) (modification optional)
Digital Effects (small, single-channel, modification - optional)
Camera CCU's (modification optional)
Monitor wall (modification optional)
Consoles (including support fax) (switcher, camera control, etc. - optional)

Task 17 - Graphics Conversion - Phase I

A. Assumptions

1. Small part of graphics facility converted, proportional to Widescreen use
1. Space available in existing graphics facility
2. Users provide information on equipment available
3. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

Character generator (modification optional)
Paint system (modification optional)
Still store (modification optional)
Small switcher (modification optional)
Monitors (modification optional)

Task 18 - Local Distribution - Phase I

A. Assumptions

1. Includes groundwork for eventual full plant distribution
2. Required if system changed to digital operation
3. Optional if system remains analog

B. Equipment

Routing switcher (20X20)
Video distribution amplifiers
Jacks & cables
Monitoring

Task 19 - VTR Replacement/Modification - Phase I

A. Assumptions

1. Small portion of VTR complement converted to handle Widescreen material
2. Includes recording/playback of programs/commercials - editing is separate
3. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

VTRs (modification optional)
Monitoring (modification optional)

Task 20 - Small Edit Facility - Phase I

A. Assumptions

1. Existing edit facility converted
2. Edit facilities converted on basis proportionate to Widescreen operation

B. Equipment

3 - VTRs (modification optional)
Switcher/Effects (small) (modification optional)
Monitoring (modification optional)

Task 21 - ENG Conversion - Phase I

A. Assumptions

1. Small part of ENG operation converted for use in Widescreen programs
2. Field and editing equipment converted proportionately
3. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

- Camcorders (modification optional)
- Cameras (modification optional)
- Field recorders (modification optional)
- Editing VTRs (modification optional)

Milestone 22 - Interim Widescreen Operation

A. Assumptions

1. Permits production of small amount of local programming/commercials
2. Facilities operate as Widescreen island in NTSC plant
3. Widescreen equipment also operates in 4:3 aspect ratio on switchable basis

Tasks 23 & 24 - Studio Conversion and Switcher & Special Effects - Completion

A. Assumptions

1. Studio operations must continue during conversion
2. Alternate control room can be provided or Widescreen facility built in parallel
3. Studio physical condition adequate for HDTV (especially floor, lighting)
4. Production issues addressed separately and not limiting to conversion
(sets, shot blocking, lighting, etc.)
5. Audio requires no change
6. If existing equipment modified, manufacturers provide instructions/parts

B. Studio Conversion Equipment (Task 23)

- Cameras (modification optional)
- Camera cable
- Prompters

C. Switcher & Special Effects Equipment (Task 24)

- Switcher w/effects (modification optional)
- Monitors (Pix & WFM) (modification optional)
- Camera CCU's (modification optional)
- Monitor wall (modification optional)
- Consoles (including support fax) (switcher, camera control, etc. - optional)

Task 25 - Digital Special Effects

A. Assumptions

1. Installed in studio control room at same time as upgrade
2. Rack space available where NTSC gear displaced (or modified)
3. Includes retrofit of initial studio converted
4. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

Digital effects system - multiple channels (modification optional)
Monitors (modification optional)

Task 26 - Graphics Conversion - Completion

A. Assumptions

1. Space available in existing graphics facility
2. Users provide information on equipment available
3. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

Character generator - additional channels (modification optional)
Paint system - additional channels/work stations (modification optional)
Still store - additional channels (modification optional)
Switcher - additional or upgrade (modification optional)
Monitors (modification optional)

Task 27 - Internal Distribution - Completion

A. Assumptions

1. Core plant distribution converted to serial digital
2. Routing switcher connectivity extended with distribution

B. Equipment

Distribution amplifiers
Repeaters
Patch panels

Task 28 - Small Edit Facility - Completion

A. Assumptions

1. Remaining small edit facilities converted
2. Conversion to/from NTSC no longer required in edit rooms

B. Equipment

- 3 - VTRs per room (modification optional)
- Switcher/Effects (small) per room (modification optional)
- Routing - internal only (optional)
- Monitoring (modification optional)

Task 29 - Large Edit Facility

A. Assumptions

1. Station has one large post production facility
2. Operation can go off-line during conversion
3. Conversion to/from NTSC no longer required in edit rooms

B. Equipment

- 5 - VTRs (modification optional)
- Switcher/Effects (large) (modification optional)
- Digital effects (modification optional)
- Routing - internal only (modification optional)
- Monitoring (modification optional)

Task 30 - Network Receiver Conversion - Completion

A. Assumptions

1. Remaining channels of network distribution to change to HDTV
2. Full time-zone-oriented operation
3. Regional networks & cutaways
4. End of NTSC distribution

B. Equipment

- Satellite receivers (equal to number replaced)

Task 31 - Routing System - Completion

A. Assumptions

1. Core plant distribution converted to serial digital
2. Includes routing switcher frame & local cabling
3. Interconnection to plant extremities in Task 27

B. Equipment

Large routing switcher, including control system

Task 32 - VTR Conversion - Completion

A. Assumptions

1. All functions other than ENG included
2. Space available where existing machines are displaced

B. Equipment

VTRs (modification optional)

Cart machines (modification optional)

Monitoring (modification optional)

Task 33 - ENG Conversion

A. Assumptions

1. Remainder of ENG operations converted to Widescreen operation
2. ENG equipment converted proportionately to rest of plant
3. Field and editing equipment converted proportionately
4. If existing equipment modified, manufacturers provide instructions/parts

B. Equipment

Camcorders (modification optional)

Field cameras (modification optional)

Field recorders (modification optional)

Editing recorders (modification optional)

ENG microwave exciters/transmitters (modification optional)

ENG microwave receivers/decoders (modification optional)

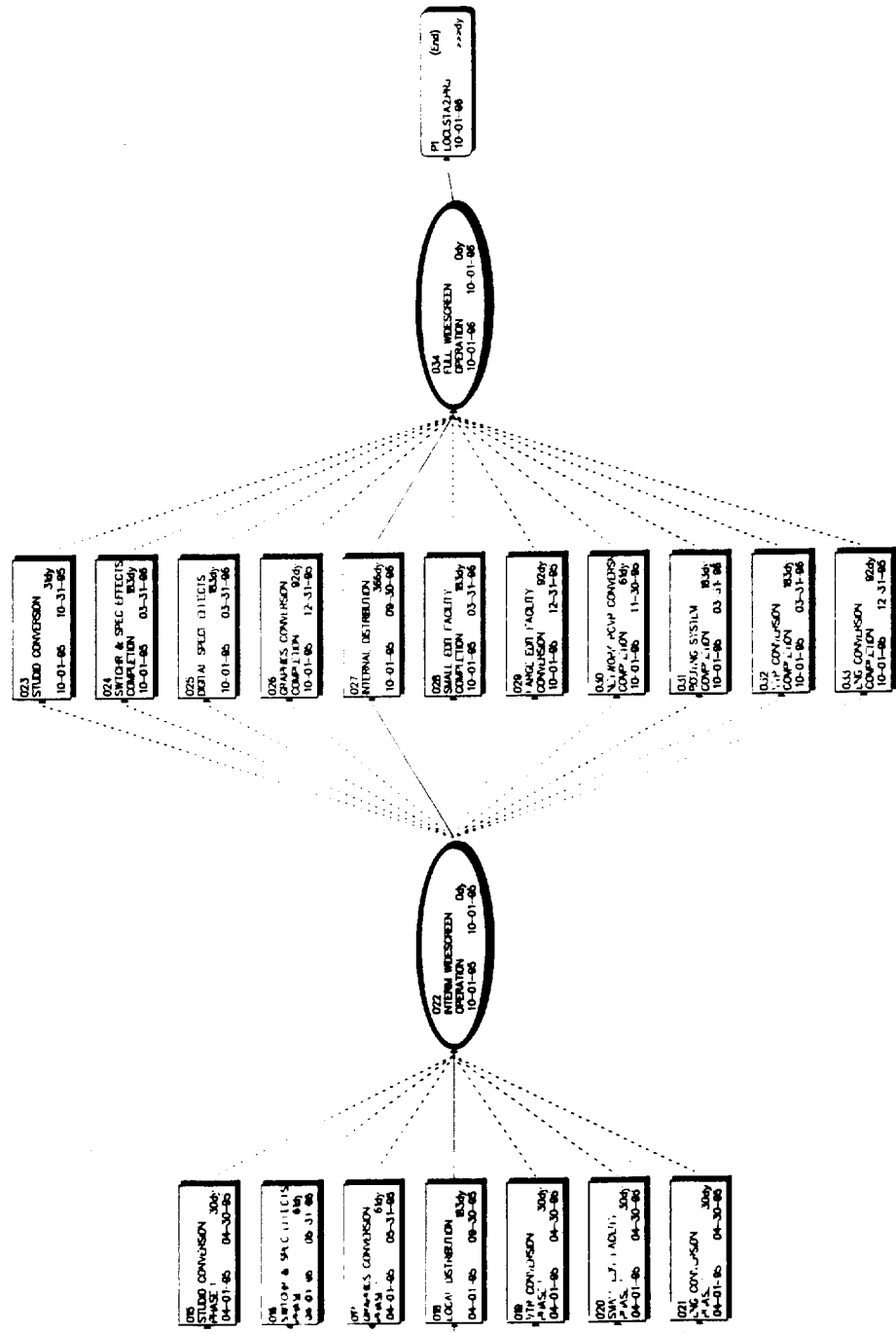
Milestone 34 - Full Widescreen Studio Operation

A. Assumptions

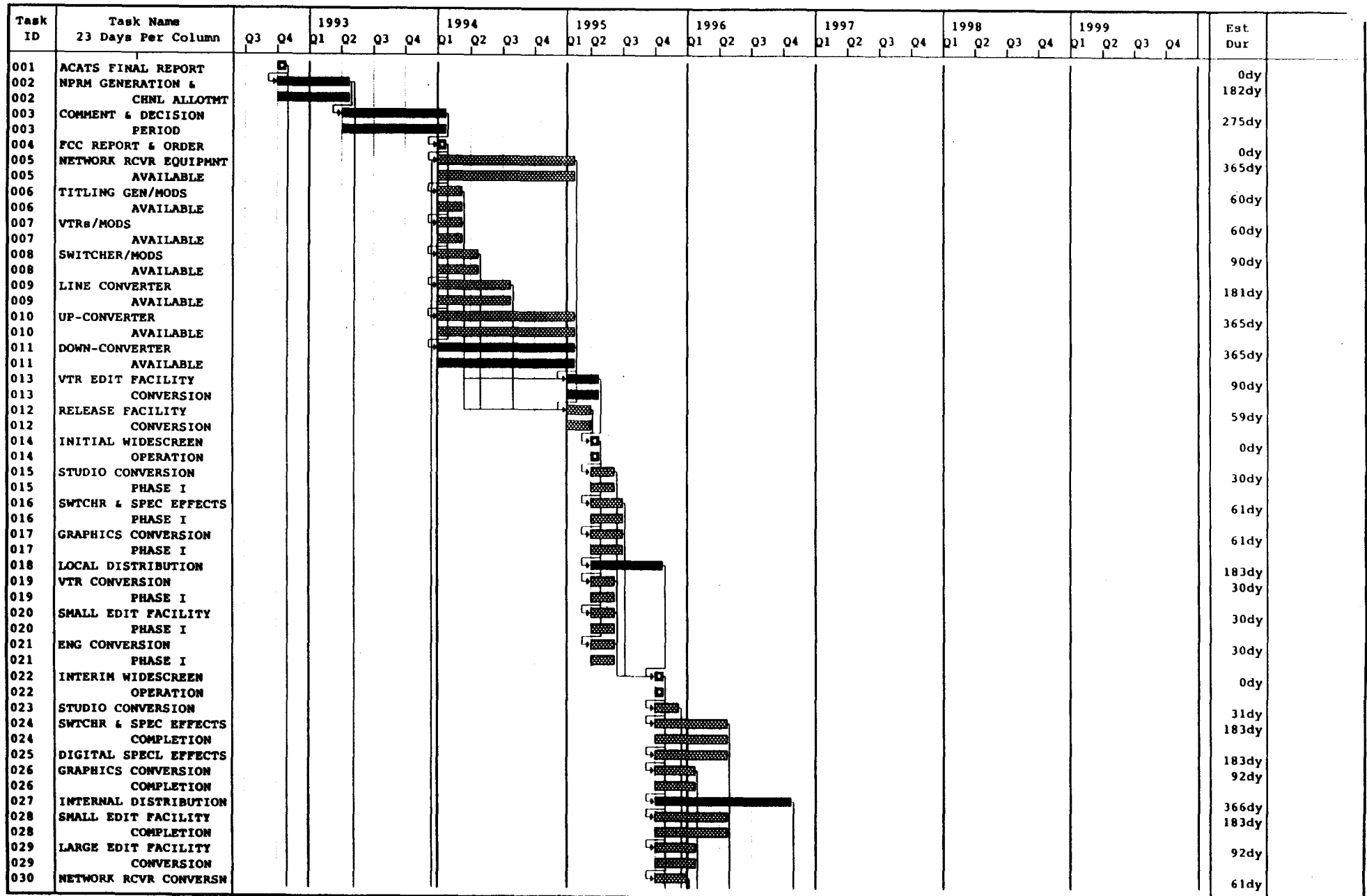
- 1. All studio operations converted to Widescreen operation**
- 2. No further NTSC production - line-conversion only**
- 3. Line-conversion used for inclusion of NTSC library material**
- 4. Widescreen output up-converted for HDTV & line-converted for NTSC transmission**

LOCAL STATION WEISSBORN 023/21 8.9 SODMARD 2

PERT Chart
 01-02-82 2.07p

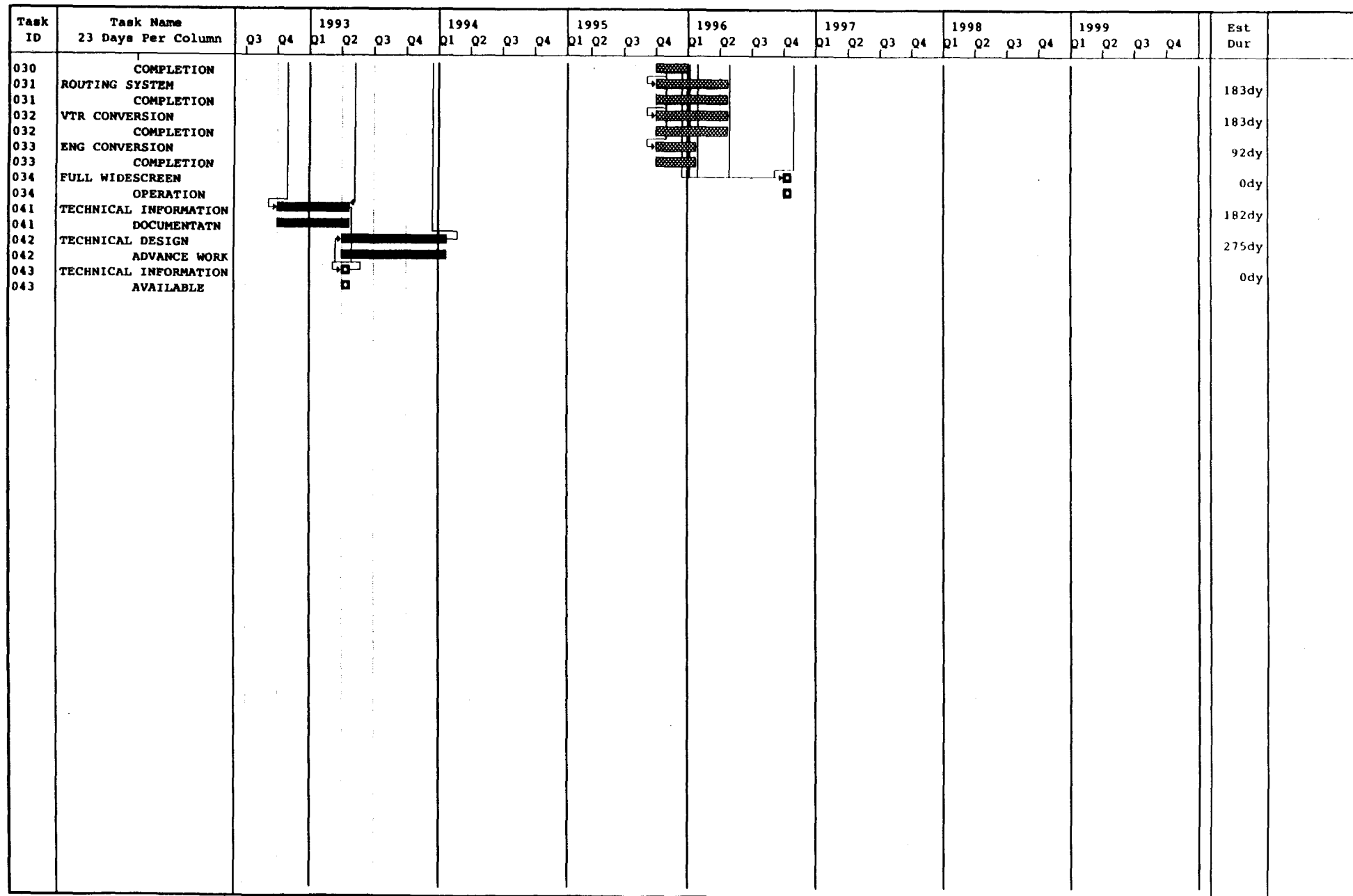


LOCAL STATION: WIDESCREEN 525/2:1, 16:9 - SCENARIO 2



— Unassigned — Interrupted ■ Noncritical ■ Critical ■ Milestone

LOCAL STATION: WIDESCREEN 525/2:1, 16:9 - SCENARIO 2



IS/WP-2 PERT Chart

Supporting List of Assumptions

Local Station: Full HDTV Replacement - Scenario 3

General Assumptions

1. Local Station is studio facility up to input of Studio-to-Transmitter Link (STL)
2. Station is commercial operation - order of tasks for public station somewhat different
3. Station is network affiliate - order of tasks for independent somewhat different
4. Station has two studios and control rooms
5. Station will maintain current level of production for long term
6. Test & Measuring Equipment includes monitoring equipment
7. Distribution Amps design insensitive to raster format
(Only bandwidth is important)
8. Up-Converter required to air NTSC programming on HDTV channel
9. Down-Converter required for HDTV programming on associated NTSC channel
10. Titling Generator required for Station ID's as a minimum
11. Small Router implies few in, 1 out, plus patching/cabling
(Design insensitive to raster format)
12. Early tasks burdened by learning process for new technology
13. Space is available for installation of new/additional equipment
(No walls, HVAC, lighting, consoles, racks, power required)
14. Station takes network in real time (no Delayed Broadcast) for Phases I & II
15. System installed uses serial digital interconnect for either analog or digital transmission
16. Design effort includes full documentation

Notes

1. Times given in associated PERT and Gantt charts are for sake of example only
2. Times given in PERT and Gantt charts will be adjusted based on manpower resource levelling
3. Tasks shown in parallel at various stages are to indicate only relative location in overall transition
4. Tasks shown in parallel may not occur in parallel once manpower availability is taken into account

Specific Assumptions

Task 15 - Construct Bypass Facility

A. Assumptions

1. All equipment must be available before start
2. Network feeds not time zone specific - no regionals
3. Single transponder, single feed
3. Manual control used for 3 sources only:
 Network Upconverted NTSC Character Generator
4. Install in existing MCR while on air
5. No effects between sources - cuts only

B. Equipment

Satellite receiver
Minimum 3 X 1 switcher
Upconverter
Character generator
Monitoring/test

Milestone 16 - Network Pass-Through Operation

A. Assumptions

1. Programming is either network-distributed or up-converted from NTSC
2. No local playback of HDTV programs or commercials
3. Program switching is cuts only
4. Character generator is full screen only

Task 17 - Convert/Install Commercial Playback Facility

A. Assumptions

1. NTSC original commercials upconverted in real time
2. HDTV commercials play from tape

B. Equipment

2 - VTRs
Monitoring
Sync/pulse
Edit controller

Task 18 - Convert/Install Release Facility

A. Assumptions

1. Interface to existing MCR control scheme
2. Install in existing MCR while on the air
3. Provides for effects between sources - e.g., super of CG

B. Equipment

Release switcher (small)
Character generator upgrade
Still store?
Frame synchronizer

Milestone 19 - Local Commercial Insertion

A. Assumptions

1. Commercials may be either HDTV or HTSC in origin
2. HDTV commercials played back in real time
3. NTSC commercials up-converted in real time
4. All material coordinated between HDTV & NTSC operations

Task 20 - VTR Record/Playback Addition

A. Assumptions

1. Need to record from satellite or play tapes
2. Back-to-back playback possible if no DB
3. 4 machines minimum needed for DB
4. Down-conversion required for simulcast of HDTV material

B. Equipment

2 - VTRs
Downconverter
Monitoring

Milestone 21 - Local Program Playback

A. Assumptions

1. Permits playback of syndicated programming delivered on tape
2. Permits long term time shifting of satellite-delivered programs
3. Permits short term time offset of programs with more machines

Tasks 22 & 23 - Studio Conversion and Switcher & Special Effects - Phase I

A. Assumptions

1. Studio operations must continue during conversion
2. Alternate control room can be provided or HDTV control room is built in parallel
3. Studio physical condition adequate for HDTV (especially floor, lighting)
4. Production issues addressed separately and not limiting to conversion (sets, shot blocking, lighting, etc.)
5. Digital effects small scale, if at all
6. Audio requires no change

B. Studio Conversion Equipment (Task 22)

Cameras
Camera cable
Promoters

C. Switcher & Special Effects Equipment (Task 23)

Switcher w/effects
Monitors (Pix & WFM)
Digital Effects (small, single-channel - optional)
Camera CCU's
Monitor wall
Consoles (including support fax) (switcher, camera control, etc.)

Task 24 - Graphics Conversion - Phase I

A. Assumptions

1. Space available in existing graphics facility
2. Users provide information on equipment available

B. Equipment

Character generator
Paint system
Still store
Small switcher
Monitors

Task 25 - Local Distribution - Phase I

A. Assumptions

1. Includes groundwork for eventual full plant distribution

B. Equipment

Routing switcher (20X20)
Video distribution amplifiers
Jacks & cables
Monitoring
Machine control

Task 26 - Small Edit Facility - Phase I

A. Assumptions

1. Existing edit facility converted
2. Conversion to/from NTSC required for continuity
3. 2nd upconverter needed since 1st devoted to air use
4. 2nd downconverter needed since 1st devoted to air use

B. Equipment

Up-converter
Down-converter
3 - VTRs
Editor
Switcher/Effects (small)
Routing - internal only
Monitoring
Control

Milestone 27 - Initial Local Program Origination

A. Assumptions

1. Permits production of small amount of local programming
2. Facilities operate as HDTV island in NTSC plant

Tasks 28 & 29 - Studio Conversion and Switcher & Special Effects - Completion

A. Assumptions

1. Studio operations must continue during conversion
2. Alternate control room can be provided or HDTV control room is built in parallel
3. Studio physical condition adequate for HDTV (especially floor, lighting)
4. Production issues addressed separately and not limiting to conversion (sets, shot blocking, lighting, etc.)
5. Audio requires no change

B. Studio Conversion Equipment (Task 28)

Cameras
Camera cable
Promoters

C. Switcher & Special Effects Equipment (Task 29)

Switcher w/effects
Monitors (Pix & WFM)
Camera CCU's
Monitor wall
Consoles (including support fax) (switcher, camera control, etc.)

Task 30 - Digital Special Effects

A. Assumptions

1. Installed in studio control room at same time as renovation
2. Rack space available where NTSC gear displaced
3. Includes retrofit of initial studio converted

B. Equipment

Digital effects system - multiple channels
Monitors

Task 31 - Graphics Conversion - Completion

A. Assumptions

1. Space available in existing graphics facility
2. Users provide information on equipment available
3. Includes clearing out existing NTSC equipment

B. Equipment

Character generator - additional channels
Paint system - additional channels/work stations
Still store - additional channels
Switcher - additional or upgrade
Monitors

Task 32 - Internal Distribution - Completion

A. Assumptions

1. Core plant distribution converted to serial digital
2. Routing switcher connectivity extended with distribution

B. Equipment

Distribution amplifiers
Repeaters
Patch panels

Task 33 - Small Edit Facility - Completion

A. Assumptions

1. Remaining small edit facilities converted
2. Conversion to/from NTSC still required
3. Up- & down-converters from first small edit facility can be shared

B. Equipment

3 - VTRs per room
Editor per room
Switcher/Effects (small) per room
Routing - internal only
Monitoring
Control

Task 34 - Large Edit Facility

A. Assumptions

1. Station has one large post production facility
2. Operation can go off-line during conversion
3. Up- & down-converters shared with small edit facilities

B. Equipment

5 - VTRs
Editor
Switcher/Effects (large)
Digital effects
Routing - internal only
Monitoring
Control

Task 35 - Network Receiver Conversion - Completion

A. Assumptions

1. Remaining channels of network distribution to change to HDTV
2. Full time-zone-oriented operation
3. Regional networks & cutaways
4. End of NTSC distribution

B. Equipment

Satellite receivers (equal to number replaced)

Task 36 - Routing System - Completion

A. Assumptions

1. Includes routing switcher frame & local cabling
2. Interconnection to plant extremities in Task 32

B. Equipment

Large routing switcher, including control system

Task 37 - VTR Conversion - Completion

A. Assumptions

1. All functions other than ENG to be replaced
2. Space available where existing machines are displaced

B. Equipment

VTRs

Cart machines

Monitoring

Task 38 - Release Facility - Completion

A. Assumptions

1. HDTV becomes predominant operation - NTSC secondary
2. Most NTSC material is down-converted HDTV
3. Monitoring oriented to wide aspect ratio

B. Equipment

Release switcher (large)

Full HDTV monitoring

Milestone 39 - Full HDTV Studio Operation

A. Assumptions

1. All studio operations converted to HDTV except ENG/SNG
2. No further NTSC production - down-conversion only
3. Up-conversion used for inclusion of NTSC library & ENG/SNG material

Task 40 - ENG/SNG Conversion

A. Assumptions

1. ENG/SNG conversion after all other aspects of operation
2. Equipment availability is later
3. Problems of weight/performance/cost more intractable

B. Equipment

- Camcorders
- Field cameras
- Field recorders
- Editing recorders
- Field encoders
- ENG microwave exciters/transmitters
- ENG microwave receivers/decoders
- SNG encoders/exciters
- SNG receivers/decoders